

would have been obvious to one of ordinary skill in the art to combine or modify the features of Brehm et al. in the manner of the claimed invention.

The present invention is directed to a particulate water-absorbent resin composition which provides the desired balance between the liquid permeability and the liquid-sucking-up property of the water-absorbent resin. As disclosed on page 4 of the specification, Applicants discovered that (1) by providing a particulate water-absorbent resin having a specific and controlled particle size, and (2) by providing a tetra- or more functional polyol at least on the surface of the water-absorbent resin particles, enhances both the liquid permeability and the liquid-sucking-up property. Thus, the combination of the particle size and the tetra- or more functional polyol at least on the surfaces of the particles are not arbitrary or random properties, but instead are specifically selected to provide a desired result in a manner that would not have been obvious or expected. One skilled in the art would not have a reasonable expectation that selecting the claimed particle size and providing a tetra- or more functional polyol at least on the surfaces of the particles would enhance the liquid permeability and enhance the liquid-sucking-up property as in the present invention. The art of record provides no reasonable expectation of success that controlling the particle size and providing a tetra- or more functional polyol at least on the surface of the particles would enhance the liquid permeability an liquid-sucking-up property and provide a good balance between the liquid permeability and liquid-sucking-up property.

As set forth in MPEP §§ 2142 and 2143, the Examiner bears the burden of presenting factual evidence to support a *prima facie* case of obviousness. Rejections based on obviousness cannot be sustained by mere conclusory statements. The Examiner must present some articulated reasoning with some rational underpinning to support the legal conclusion of obviousness.

The Action does not satisfy the exemplary rationale for setting forth a *prima facie* case of obviousness as set forth in MPEP § 2143. For example, the Action has not established that combining elements from the cited patents would yield predictable results. As discussed above, the invention is directed to the discovery that the combination of the claimed particle size and the existence of the tetra- or more functional polyol at least on the surface of the particles enhances and provides a good balance between the liquid permeability and the liquid-sucking-up property. The Action has not shown that the particle size and the presence of the tetra- or more functional polyol perform the same function separately as in the combination according to the claimed invention or that one of ordinary skill in the art would have recognized that the combination as claimed would provide a predictable enhancement of the liquid permeability and the liquid-sucking-up property. MPEP § 2143(a).

The Action also fails to establish that the claimed invention is a substitution of one known element for another. The Action does not establish that substituting a known property of the water-absorbent resin composition would provide a known function or that one of ordinary skill in the art could have substituted a known property for another with the substitution providing a predictable result. MPEP § 2143(b). As noted above, the combination of the claimed particle size and the presence of the tetra- or more functional polyol provide an unexpected improvement in the liquid permeability and liquid-sucking-up property.

The Action also fails to demonstrate that selecting the particle size and the presence of the tetra- or more functional polyol at least on the surfaces of the particles is a known technique to improve the properties of the water-absorbent resin composition. MPEP § 2143(c). The Action has not shown that one of ordinary skill in the art could have applied a known technique to improve the liquid permeability and/or liquid-sucking-up property or that combining the claimed particle size range and the tetra- or more functional polyol would provide a predictable enhancement of the liquid permeability and liquid-sucking-up property. The Action further fails

to establish that the claimed particle size range and/or the presence of a tetra- or more functional polyol is a known technique recognized by one of ordinary skill in the art to provide the improvements of the claimed invention. MPEP § 2143(d).

Applicants further submit that it would not have been obvious to try to enhance the liquid permeability and liquid-sucking-up property by controlling the particle size range and providing the tetra- or more functional polyol at least on the surfaces of the particles. MPEP § 2143(e). There is no suggestion in the art of record that the particle size range and the presence of the tetra- or more functional polyol would provide a predictable result with a reasonable expectation of success. There is no finding that one of ordinary skill in the art could have solved the problems of the present invention with a reasonable expectation of success by controlling the particle size range and providing the tetra- or more functional polyol as in claim 1. MPEP § 2143(e).

The Action does not establish that there are any design incentives or market forces that would have prompted the improvement attained according to the present invention or that one of ordinary skill in the art would have been motivated to combine the teachings of the cited patents or modify the cited patents in a manner to achieve the claimed invention or that there would have been a reasonable expectation of success. MPEP §§ 2143(f) and 2143(g).

As noted in the Action, Brehm et al. does not suggest a particulate water-absorbent resin composition having a particle size within the claimed range of 850 to 150  $\mu\text{m}$ , but not including 850  $\mu\text{m}$  accounting for not less than 90 wt% of the water-absorbent resin composition. Furthermore, Brehm et al. clearly does not suggest to one of ordinary skill in the art that the particle size within the claimed range provides the improved properties obtained according to the present invention.

The particle size referred to in Brehm et al. relates broadly to various screening processes. Brehm et al. does not disclose that the final product has a particle size range within

the claimed range or that selecting and controlling the particle size range provides the advantages and improved properties of the resulting water-absorbent resin according to the claimed invention. The surface crosslinking changes the particle size of the water-absorbent resin so that the resulting particles of Brehm et al. do not inherently have the claimed particle size range. The surface crosslinking step includes water and other solvents that can change the particle size. Thus, the particle size of the finished particles according to Brehm et al. do not necessarily correspond to the particle size before crosslinking.

Brehm et al. is specifically directed to water absorbing polymers having interstitial compounds. The compounds disclosed by Brehm et al. are specifically provided for functioning as deodorant substances. See, for example, paragraph 0022 to 0027 and 0070. Brehm et al. only disclosing embedding the cyclodextrins and the zeolites in the polymer to provide strong binding between the cyclodextrin and the zeolite in the polymer. Brehm et al. does not disclose or suggest that the cyclodextrin is provided at least on the surfaces of the water-absorbent resin particles.

The Action provides no reasonable basis for the position that the cyclodextrin of Brehm et al. inherently is on the surface of the particles. The cyclodextrin and the zeolite are combined and mechanically mixed specifically to incorporate the cyclodextrin and zeolites within the polymer. Accordingly, the position in the Action that the cyclodextrin is inherently on the surface of the particles is based on speculation and is not supported by the evidence of record.

As noted above, the present invention is directed to the discovery that the combination of the claimed particle size and the tetra- or more functional polyol on the surface of the particles provide an enhanced liquid permeability and liquid-sucking-up property. Brehm et al. on the other hand is concerned only with providing a deodorant effect. Brehm et al. clearly provides no reasonable expectation to one of ordinary skill in the art that the combination of the particle size

and the tetra- or more functional polyol can provide the improved properties according to the present invention.

As disclosed on page 19 of the present specification, the polyols are preferably sugar alcohols that are not higher than disaccharides and most favorably D-sorbitol. In contrast, Brehm et al. specifically selects a high molecular weight polysaccharide to provide a chemical linkage to the absorbent. Brehm et al. does not disclose and the Action provides no basis to support the position that the cyclodextrin of Brehm et al. provides the improved liquid permeability and liquid-sucking-up properties. The Action does not establish that the tetrapolyol of the present invention is a know equivalent or substitute for the cyclodextrin of Brehm et al.

The Action suggests that the claims do not exclude the use of a zeolite such that the claimed composition is inherently the same as the composition of Brehm et al. Applicants respectfully submit this position is unfounded. Brehm et al. specifically requires the combination of the cyclodextrin and the zeolite to provide the deodorant effects. There is no basis for the position that the combination of a zeolite and the cyclodextrin of Brehm et al. inherently provide the same water-absorbent resin particles with the same properties. Moreover, there is no basis for the position that the properties of the resulting composition of Brehm et al. are inherently the same as the claimed invention either with or without the essential zeolite of Brehm et al. Brehm et al. requires cyclodextrin and zeolite as essential components to the composition that are embedded within the composition. Such additives clearly change the properties of the resulting product such as providing the deodorant properties intended by Brehm et al.

The Action provides no basis or rationale to support the position that it would have been obvious to modify Brehm et al. by replacing the cyclodextrin with a tetra- or more functional polyol of the invention with the claimed particle size to provide the enhanced properties of the present invention. Brehm et al. provides no reasonable expectation of success and one of

ordinary skill in the art would not be motivated to modify Brehm et al. according to the claimed invention. Accordingly, independent claim 1 is not obvious over Brehm et al.

Independent claim 4 is also not obvious over Brehm et al. The Action asserts that the product according to Brehm et al. is the same or substantially the same as the claimed invention. Applicants respectfully disagree. Brehm et al. only discloses a water-absorbent resin polymer. However, all water-absorbent resin polymer particles clearly do not have the same properties even when made from the same or similar starting materials. There are many factors that determine the properties of the resulting resin. Therefore, simply because Brehm et al. discloses a water-absorbent resin does not inherently establish that every property is identical.

As noted in the Action, Brehm et al. does not disclose the claimed particle size of an internally crosslinked and surface crosslinked resin. Therefore, the resulting product of Brehm et al. does not inherently have a liquid distribution velocity within the claimed range. Brehm et al. provides no teaching to one of ordinary skill in the art and the Action provides no evidence to support the position that the claimed liquid distribution velocity is inherent in the product of Brehm et al.

The variations in the properties of the resins are demonstrated in the Examples of the present specification. The Examples and Comparative Examples in the present specification demonstrate that the liquid distribution velocity and other properties are improved by the particulate water-absorbent resin according to the claimed invention. Thus, the Examples in the specification demonstrate that the product obtained according to Brehm et al. is not inherently the same as the claimed invention. The particle size of the water-absorbent resin polymer is not the sole means of predicting the liquid distribution velocity as in claim 4 or the surface OH/C ratio of claim 5. Moreover, Brehm et al. clearly provides no suggestion or reasonable expectation that the particle size range in combination with the liquid distribution velocity or the particle size range in combination with the OH/C ratio provide the improved liquid permeability

and liquid-sucking-up properties as in the present invention. There is no basis presented in the Action that Brehm et al. inherently has a liquid distribution or OH/C ratio as in claims 4 and 5. Based on the teachings of Brehm et al., one of ordinary skill in the art would have no reasonable expectation that the combination of the particle size and the liquid distribution velocity and OH/C ratio would provide an improvement of the liquid permeability and sucking-up properties. Accordingly, claims 4 and 5 are not obvious over Brehm et al.

For the reasons discussed above, Brehm et al. provides no motivation to provide a tetra- or more functional polyol at least on the surfaces of the composition as in claim 6, in combination with the liquid distribution velocity of claim 4. Brehm et al. further fails to suggest the claimed average particle diameter and logarithmic standard deviation of the particle size distribution of claim 7. As disclosed on page 15, the narrow particle size distribution as defined by the logarithmic standard deviation is important to the present invention. The narrow particle size distribution enables the enhancement of the properties according to the present invention. Thus, the particle size distribution is not a random or arbitrary property, but is instead selected to provide the improved properties of the water-absorbent resin composition. Accordingly, the particle size distribution of claim 7 in combination with the particle size range and tetra- or more functional polyol at least on the surface of the particles of claim 1 is not obvious over Brehm et al. Brehm et al. does not disclose or suggest a particle size distribution and the Action provides no rational basis for the position that the particle size distribution of claim 7 is inherent in or obvious over Brehm et al.

Brehm et al. also does not suggest the tetra- or more functional polyol within the claimed range of claim 8, or the tetra- or more functional polyol being a sugar alcohol as in claim 9, in combination with the features of claim 1. Accordingly, claims 8 and 9 are not obvious over Brehm et al. Brehm et al. does not disclose a composition having a water absorption capacity without load, water absorption capacity under load, or saline flow conductivity within the range

of claims 10, 11 and 12. As discussed above, the claimed combination of the particle size range and the presence of the tetra- or more functional polyol at least on the surfaces provide an enhanced liquid-sucking-up property. This feature is not recognized by Brehm et al. and is not a known characteristic to one of ordinary skill in the art. Brehm et al. does not inherently have a liquid-sucking-up rate of claims 13 and 15, either alone or in combination with the features of claim 1. For the reasons discussed above, the particle size distribution has an effect on the properties of the resulting water-absorbent resin composition. Brehm et al. does not disclose and does not inherently have a particle size distribution within the claimed range of claim 16. Furthermore, Brehm et al. provides no expectation that the particle size distribution within the claimed range can provide the improved properties of the present invention. Accordingly, these claims are not obvious over Brehm et al.

In view of the deficiencies of Brehm et al. and the above comments, the claims are submitted as being allowable. Accordingly, claims 1 and 4-16 are allowable over Brehm et al.

### **Rejection of Claims 2 and 3**

Claims 2 and 3 are rejected under 35 U.S.C. § 103 as being obvious over Brehm et al. in view of U.S. Patent No. 5,314,420 to Smith et al. Smith et al. is cited for disclosing crosslinking agents.

As noted above, Brehm et al. is specifically directed to providing a deodorizing agent to the water-absorbent resin by mechanically incorporating a cyclodextrin and a zeolite into the polymer. Smith et al. is relevant only to the extent that various crosslinking agents are disclosed. The Action provides no basis or rationale for the position that it would have been obvious to provide a tri- or more functional polycation on the surface of the particles based on the disclosure of a crosslinking agent in Smith et al.



As disclosed in the specification, the combination of the tetra- or more functional polyol and the tri- or more functional polycation can provide the enhanced properties of the resulting particulate water-absorbent resin composition. See, for example, page 4, lines 16-18, of the specification. One skilled in the art would have no reasonable expectation of success in using the crosslinking agent of Smith et al. with Brehm et al. to provide enhanced liquid permeability and liquid-sucking-up properties of the resin. Smith et al. does not reasonably suggest a polyol and a tri- or more functional polycation on the surface of the particles as in claim 2, or the particle size range of claim 3. Accordingly, claims 2 and 3 are not obvious over the combination of Brehm et al. and Smith et al.

#### **Rejection of Claims 1-16 and 18-22**

Claims 1-16 and 18-22 are rejected under 35 U.S.C. § 103(a) as being obvious over the combination of U.S. Patent Publication NO. 2004/0214946 to Smith et al. in view of Brehm et al.

Smith '946 is relevant to the extent that superabsorbent polymers are disclosed that have a crosslinked structure and have a high permeability. Smith '946 does not disclose or suggest the features of the claimed invention.

As disclosed on page 4 of the present specification, the improved properties including, for example, the liquid permeability and liquid-sucking-up property of the water-absorbent resin of the claimed invention are obtained by 1) controlling the specific particle size and providing a tetra- or more polyfunctional polyol at least on the surface, 2) providing a particulate water-absorbent resin composition having a tetra- or more functional polyol and a tri- or more functional polycation on the surfaces, 3) providing a particulate water-absorbent resin composition having a controlled specific particle size in relation to the liquid distribution velocity and the water absorption capacity without load, or 4) providing a water-absorbent resin

composition having a specific particle size and a controlled surface OH/C ratio. The art of record provides no motivation or incentive to control these features of the invention and provide no reasonable expectation of success in enhancing the liquid permeability and the liquid-sucking-up property by controlling these aspects of the invention.

The Action provides no basis or rationale for the position that it would have been obvious to modify the surface crosslinked particles of Smith '946 by including the cyclodextrin and/or zeolite of Brehm et al. Brehm et al. is specifically directed to providing a deodorant property by the addition of the cyclodextrin and the zeolite. Smith '946 is unrelated to the deodorant properties. One skilled in the art would not be motivated to include the cyclodextrin of Brehm et al. and the zeolite with the composition of Smith '946. Moreover, even if one were to do so, the resulting composition would not inherently have the same properties of the claimed invention.

Smith '946 does not include the claimed particle size of 850 to 150  $\mu\text{m}$  but not including 850  $\mu\text{m}$  accounting for not less than 90 wt% of the particulate water-absorbent resin and having a tetra- or more functional polyol at least on the surface of the particles as in claim 1. As Brehm et al. is directed to providing a deodorant, it would not have been obvious to one of ordinary skill in the art to modify Smith '946 to include the cyclodextrin of Brehm et al. The Action provides no basis or rationale for the combination of the cited patents. The Action has not established that Brehm et al. is a known technique for enhancing liquid permeability and/or the liquid-sucking-up property. Brehm et al. and Smith '946 are not concerned with overcoming the problems of the prior products according to the present invention. Therefore, one of ordinary skill in the art would have no reasonable expectation of enhancing the properties of the water-absorbent resin composition by the combination of the teachings of Brehm et al. and Smith '946. Accordingly, the Action fails to establish *prima facie* obviousness of the claimed invention.

As discussed above, Brehm et al. also does not disclose or suggest the claimed particle size either alone or in combination with the tetra- or more functional polyol. The Action suggests that the cyclodextrin of Brehm et al. “must” inherently be on the surface of the resin particles. This position is based on speculation and is unsupported by Brehm et al. or any evidence of record. The Action further contends that Applicants have not submitted any data to show that the cyclodextrin of Brehm et al. is not on the surface. Applicants are not required to submit experimental data where the Action has not established or provided a reasonable basis for the cyclodextrin being on the surface. Brehm et al. specifically discloses mechanically mixing the cyclodextrin and the zeolite with the polymer to provide the deodorant properties. The Action provides no rational explanation for the position that the cyclodextrin must inherently be on the surface of the particles of Brehm et al.

Smith ‘946 also discloses mixing the penetration modifiers with the water soluble polymers. Smith ‘946 provides no suggestion to one skilled in the art that the water soluble additives as penetration modifiers are inherently on the surface of the particles as asserted in the Action.

Smith ‘946 also provides no reasonable expectation of success that controlling the particle size and providing the tetra- or more functional polyol at least on the surfaces of the particles as in claim 1 can enhance the liquid permeability and the liquid-sucking-up property. As noted on page 6 of the Action, Brehm et al. is relied on only for disclosing a particle size. The combination of Brehm et al. and Smith ‘946 clearly provides no guidance or suggestion to one of ordinary skill in the art that controlling the particle size can have an effect on the liquid permeability and/or liquid-sucking-up property. The penetration modifiers disclosed in Smith ‘946 provide no reasonable expectation of success that the tetra- or more functional polyol in combination with the claimed particle size provide enhanced properties.

The Action relies on the position that it would have been obvious to select a known material based on its suitability for its intended use. Neither Smith '946 or Brehm et al. support the position that controlling the particle size and providing the tetra- or more functional polyol are known by one of ordinary skill in the art to enhance the properties of the resulting water-absorbent resin composition.

The resulting product of Smith '946 is not inherently the same as the claimed invention. The Action provides no evidence to support this feature. All water-absorbent resin particles are not inherently the same. Thus, merely because Smith '946 and Brehm et al. disclose water-absorbent resins does not support the position that the properties are the same or substantially the same. Internally crosslinking and surface crosslinking water-absorbent resins do not inherently result in the same particles with identical properties.

For the reasons discussed above, claim 1 is not obvious over the combination of Smith '946 and Brehm et al. Smith '946 and Brehm et al. also clearly fail to suggest to one of ordinary skill in the art a particulate water-absorbent resin composition having a tetra- or more functional polyol and a tri- or more functional polycation at least on the surface of the particles as in claim 2. The Action provides no reasonable basis to support the position that the polyol and the polycation are retained on the surfaces of the particles. The Action further fails to establish that it would have been obvious to provide the particle size range of claim 3, in combination with the features of claim 2 with a reasonable expectation of success in enhancing the properties of the resulting particulate water-absorbent resin composition.

As noted above, the invention is directed to the discovery that the specific combination of features are able to provide enhanced properties to the water-absorbent resin composition. Smith '946 and Brehm et al. provide no suggestion that the liquid distribution velocity either alone or in combination with the particle size range of claim 4 provide a reasonable expectation of enhancing the properties of the water-absorbent resin. The Action has not established that it

is known that modifying the liquid distribution velocity has an effect on the liquid permeability and/or liquid-sucking-up properties. Accordingly, claim 4 is not obvious over the combination of the cited patents.

The Action also has not established that the OH/C ratio of claim 5 is a known technique in improving the liquid permeability and/or liquid-sucking-up properties. Smith '946 and Brehm et al. provide no reasonable expectation that controlling the particle size range and providing an OH/C ratio of claim 5 can enhance the properties of the water-absorbent resin. Accordingly, claim 5 is not obvious over the combination of the cited patents. For the reasons discussed above, the art of record provides no suggestion that a polyol of claim 6 either alone or in combination with the particle size and liquid distribution velocity of claim 4 are able to enhance the properties of the water-absorbent resin. The ability to enhance the liquid permeability and the liquid-sucking-up property by controlling the particle size range, the liquid distribution and providing a polyol as in claim 6 is unexpected to one of ordinary skill in the art.

As discussed in the specification, the particle size distribution has an effect on providing the enhanced properties of the resulting water-absorbent resin composition. Smith '946 and Brehm et al. provide no reasonable expectation of success that the particle size distribution of claim 7 in combination with the features of claim 1 are able to enhance the properties.

Smith '946 and Brehm et al. also provide no suggestion that the polyol within the range of 0.01 to 20 wt% as in claim 8, the polyol being a sugar alcohol as in claim 9, the composition having a water absorption capacity without load of not less than 20 g/g as in claim 10, a water absorption capacity under load of not less than 20 g/g as in claim 11, a saline flow conductivity of not less than  $10^{-7} \times \text{cm}^3 \times \text{s} \times \text{g}^{-1}$  as in claim 12, in combination with the features of claim 1 provide enhanced properties. The cited patents further fail to suggest the particulate water-absorbent resin composition having an absorption capacity without load divided by the liquid-sucking-up rate of not less than 0.15 as in claim 13, the water absorption capacity

under load divided by the liquid-sucking-up rate of not less than 0.15 as in claim 14, the saline flow conductivity divided by the liquid-sucking-up rate of not less than 0.50 as in claim 15, or the particle size distribution of claim 16, are inherent in the product of Smith '946 either alone or in combination with the features of claim 1.

Claim 18 is also not obvious over the combination of Smith '946 and Brehm et al. Smith '946 and Brehm et al. do not suggest producing a water-absorbent resin having the claimed particle size range and mixing the water-absorbent resin with a tetra- or more functional polyol. Brehm et al. and Smith '946 clearly fail to suggest mixing a sugar alcohol with a water-absorbent resin as in claim 19. The cyclodextrin of Brehm et al. is not a sugar alcohol within the meaning of the claimed invention.

Smith '946 and Brehm et al. also provide no suggestion of the claimed particle size distribution of claim 20 to provide enhanced properties. One of ordinary skill in the art would have no reasonable expectation of success in adjusting the particle size distribution of claim 20 to improve the properties of the resulting composition based on the disclosures of Smith '946 and Brehm et al.

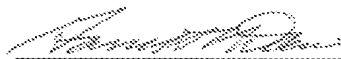
The Action provides no rational basis to assert that it would have been obvious to provide a heat treatment so that 10 to 90% of the polyol remain unreacted in the particulate water-absorbent resin composition. In contrast, Brehm et al. expressly discloses the cyclodextrin being mechanically mixed so that the cyclodextrin bonds with the acid groups on the polymer. The Action provides no basis to support the position that Brehm et al. or Smith '946 inherently have 10 to 90% of a polyol in the unreacted state. Accordingly, claim 21 is not obvious over the combination of the cited patents.

Brehm et al. and Smith '946 also provide no suggestion of surface crosslinking the water-absorbent resin particles and adding a tetra- or more functional polyol where a

crosslinking agent and the polyol are different as in claim 22. Accordingly, claim 22 is not obvious over the combination of the cited patents.

In view of the above comments, reconsideration and allowance are requested.

Respectfully submitted,



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